Weld Dilution from Cross-Section Areas

Dilution of a weld (share of melted base metal in the weld metal) from the areas of melted base metal and added filler, with the weld content of an element.

Method: Dilution D = A_base/(A_base + A_filler); weld composition by mixing

Input parameters

Unit system: SI

Parameter	Value	Unit
Melted base metal area	18.000	mm²
Added filler metal area	42.000	mm²
Element in the base metal (mass fraction)	0	%
Element in the filler metal	19.000	%

Calculated results

Parameter	Value	Unit
Dilution	30.000	%
Element in the weld metal	13.300	%

Notes for this case

- Measure areas on a macro-etched section. Composition by simple mixing of base and filler.

Formula and method

$$D = \frac{A_b}{A_b + A_f}, \quad c_w = D c_b + (1 - D) c_f$$

Variables

A_b	Melted base metal area	m²
A_f	Added filler metal area	m²
c_b	Element in the base metal (mass fraction)	-
c_f	Element in the filler metal	-
D	Dilution	-
c_w	Element in the weld metal	-

Method and standards

Area ratio.

Assumptions and limits

- Uniform mixing.
- Dilution is an area (volume) share, applied here to mass-fraction compositions: this assumes base and filler of similar density (not true for, say, a nickel alloy on aluminium).

References

- Dilution D = A_base/(A_base + A_filler); weld composition by mixing

Report details

Report reference	FCC-AT68-Y8P8 (the same inputs always give the same reference)
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Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/materials/welding/weld-dilution

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.